Exhibit I

DECLARATION OF DR. NIKIL JAYANT

I, Nikil Jayant, hereby declare as follows:

1. I am currently a Georgia Research Alliance Eminent Scholar at the Georgia Institute of Technology and Executive Director of GCATT, the Georgia Centers for Advanced Telecommunication Technology. I have worked for more than 35 years in the field of signal processing, including audio compression. Attached as Exhibit A is my Professional Biography, which describes my education, professional work, and awards.

2. I am familiar with the technology described and claimed in U.S. Patent No. 5,341,457 (the "'457 patent") and U.S. Reissue Patent No. Re 39,080 (the "'080 patent"). I previously testified as an expert witness for Lucent Technologies at a jury trial in the United States District Court for the Southern District of California regarding infringement of these two patents. (*Lucent Technologies Inc. v. Gateway, Inc.*, Case No. 3:02-cv-02060 (RWB) (the "Microsoft Litigation") In that case, the jury returned a verdict of infringement in Lucent's favor, consistent with my testimony. Attached as Exhibit B to this declaration is a portion of my testimony in that case.

3. The '457 and '080 patents are directed to fundamental aspects of audio-compression. Compression of an audio signal is necessary when the amount of data required (*i.e.*, number of bits or bit rate) to store or transmit the audio signal exceeds the capacity of the available media. The inventions described and claimed in the '457 and '080 patents exploited the then new and emerging field of perceptual audio coding to allow compression of audio signals, such as music, by using models of human hearing to maximize the degree of compression while maintaining high levels of audio quality. The work described in these patents now forms the basis for many modern-day MP3 audio coders.

4. This fact is illustrated by the MP3 industry standard itself, which while not mandating any particular encoding scheme, provides a exemplary encoder that employs the inventions of both the '080 and '457 patents. The MP3 Standard is attached to this declaration as Exhibit C.

5. Claim 4 of the '080 patent generally claims a decoder that is capable of decoding signals that have been encoded according to the methods described in the '080 patent.

6. In the Microsoft Litigation, I reviewed Microsoft's Windows Media Player 10 and 11 and the associated source code that performed MP3 encoding in Windows Media Player 10 and 11. I testified that both Windows Media Player 10 and 11 infringe claim 1 of the '080 patent when used to encode an MP3 file. My testimony included a detailed explanation of claim 1 and my infringement analysis. Ex. B, 134:9-20, 136:6-155:25.

7. I also testified regarding infringement of claim 4 of the '080 patent. Ex. B, 182:24-192:19. In particular, I testified that claim 4 claims a decoder that decodes the frequency coefficients that are encoded according to claim 1, such as the MP3 output of Windows Media Player 10 and 11. Ex. B, 183:15-184:1, 185:24-186:15.

8. Consistent with the claim construction in that case, I testified that claim 4 contains means plus function claim elements and that the corresponding structure that performs the claimed functions includes a digital signal processor (DSP), a DSP with software, VLSI hardware embodiments or hybrid DSP/VLSI embodiments. I further testified that a DSP is a digital signal processor that processes digital data and that VLSI hardware could, for example, refer to a computer chip. Ex. B, 184:7-185:23, 189:22-190:12.

9. I testified that devices that had the ability to decode MP3 files encoded using Windows Media Player 10 or 11 included all of the elements of claim 4 of the '080 patent, and, therefore, infringed that claim. Ex. B, 185:24-192:19.

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct and that this declaration was executed on this 9th day of November 2007.

Nikil Jayant

Exhibit A

PROF. NIKIL JAYANT : PROFESSIONAL BIOGRAPHY

jayant@gatech.edu

404-894-7285 (Office)
678-522-6543 (Cell)

CV Sections

ONE-PAGE SUMMARY

Current Academic Appointments

Georgia Research Alliance Eminent Scholar
John Pippin Chair in Wireless Systems
Executive Director, Georgia Centers for Advanced Telecommunication Technology
Director, Georgia Tech Broadband Institute
Strategic Partnerships Director: Information Sciences, Technologies and Services

Education

PhD Electrical Communications Indian Institute of Science-Stanford Residency	1970
BS Electrical Communications Indian Institute of Science	1965
BS Physics, Mathematics Mysore University, India	1962
Mini-MBA AT&T School of Business (1994)	

Professional Affiliations

Georgia Institute of Technology, School of Electrical and Computer Engineering	1998-Present
Bell Laboratories (AT&T, Lucent)	1968-1998
Stanford University	1967-1968
Founder, MediaFlow LLC	1999-Present
Co-Founder and Chief Scientist, EGT (an ATDC Company)	2000- 2006
Chair, National Academies Broadband Committee	2000-2002
Advisory Board Member, Infocomm Institute, A*STAR, Singapore	2004- Present

Publications: 5 Books, 5 Book Chapters, 142 Papers, 38 Patents

Fiscal Responsibilities

Managed a $60M budget as Bell Labs Director, $ 5M as Department Head	1986-97
Procured $6M for ventures in speech, audio and multimedia technologies	1994-97
Provided help as requested, as Georgia Research Alliance Scholar, in co-ordinating a multi-college research program with an annual research budget of $ 20M +	1998-2006
Procured, as Broadband Institute Director, $ 3M in research funding from Industry	1998-Present
Helped raise, as Chief Scientist of EGT, $ 20M in venture capital	2001-2006

Major Awards and Honors

IEEE Browder Thomson Prize Paper Award (1974)
IEEE Donald Fink Prize Paper Award (1995)
Fellow of the IEEE
Recipient of the IEEE Third Millennium Medal
Recipient, Lucent Patent Recognition Award
Member, New Jersey Inventors Hall of Fame
Member, National Academy of Engineering

GEORGIA INSTITUTE OF TECHNOLOGY

GEORGIA INSTITUTE OF TECHNOLOGY **1998-Present**

Georgia Research Alliance Eminent Scholar
Responsible for creating and leading cross-disciplinary research programs in communications, computing and content processing, and for relating these to economic development in the State.

Coordinated GRA Infrastructure Funding in the Advanced Communications Cluster : 1998-2004
Facilitated acquisition of several multifaculty resources including the Residential Laboratory (Aware Home), the Smart Antenna Laboratory,the Software Radio Laboratory and the Optical Networking Laboratory. These resources support research in many organizations, particularly the School of ECE, the College of Computing and GTRI, and have led to significant Federal Funding of associated research programs

Co-chaired (with BellSouth Executive) the 2005 Batelle Study on 2004-2005
Roadmapping of Advanced Communications in Georgia

John Pippin Chair Professor of Electrical and Computer Engineering 1998-Present

Created an interdisciplinary laboratory for research in the intersecting disciplines of media processing, communications and computing. Laboratory thrusts include:

- Semantic Information Retrieval on Mobile Information Devices
- Power-Aware Speech Recognition
- Video Coding and Quality Measurement for IPTV
- Wireless Video Communications for Mobile Telehealth (with the Medical College of Georgia)

Director, Georgia Tech Broadband Institute 1999-Present

Proposed and implemented the integration of the Wireless Institute with programs in optical and wired access. The resulting Broadband Institute program involves 40 faculty from the Colleges of Engineering and Computing, and GTRI. Principal contributions include:

- One of the world's first demonstrations of Gigabit Wireless (2002)
- One of the world's first demonstrations of 100 Gigabit Single-Laser Optics with a 200km range
- Definitive contributions to IPTV including automatic measurement of network and media quality
- Context-aware home applications supporting *Aging in Place* for older citizens.

Director, Georgia Tech Wireless Institute 1998-1999

Proposed and implemented the integration of a broad array of wireless research at GT into impactful programs in teaching, research and industry partnership. The program coalesced the work of 20 faculty involved in Electromagnetics, Network Systems and Wireless Multimedia

Director, State of Georgia (Yamacraw) Program in Research Prototyping 1999-2004

Responsible for the design and integration of broadband systems for Information Technology. This program involved 25 faculty with the complementary research targets of 1 gigabit per second wireless and 1 gigabit per second per user optical in the home:

Executive Director, Georgia Centers for Advanced Telecommunications Technology 1999-Present

Responsible for leading multidisciplinary cross-campus research of 20 multi-faculty centers in Content Processing, Computing and Communications

Principal contributions include:

Technology: Campus-wide STC and ERC research proposals that led to two NSF-ITR Awards
Policy: Broadly recognized work on universal access at national , state and local levels
Commercialization: Partnerships with ATDC and VentureLab on faculty startup opportunities

Strategic Partnerships Director 2005- Present

Responsible for coordinating campus-wide industry partnerships.

Principal contributions include:

Partnership with HP and Nortel (with OIT)
Partnership with Cox (with Tennenbaum Institute and School of Literature, Culture, Communications)
Partnership with IBM (with IMTC and the Health Systems Institute)

Committee Service

PhD examinations (35)
Faculty Recruiting (4)
Reappointment, Promotion and Tenure (1)
Faculty Awards (1)
Other School and Campus Committees (2)

Consulting

AT&T, HP, Interdigital, Lucent, and Qualcomm 1999-Present

Entrepreneurial Activity

Co-founder and Chief Scientist, EGT Provider of video solutions 2001- 2006
Started Elastic Video and VQTech (VentureLab Initiatives) 2007

Teaching and Curriculum Development

- Introduced special topics course, *Multimedia Communications* 1999
- Taught the course for three years, upgraded it to regular graduate course 2003
- Obtained teaching effectiveness score of 4.75 (on a 5-pt scale) 1998-Present
- Collaborated on the curriculum committee for Georgia Tech International 2004-Present

Student Guidance

Special Topic Research Assistantships

- Joon Hyun Sung, *Mutimedia Storage in Multibit Memories* 1999
- Kihong Kim, *Network Protocol for Video Messaging* 2000

Master's Theses

- Brian Delaney *Power Efficient Distributed Voice User Interface* MS 1999
- Babak Firoozbakhsh, *Wireless Communication for Wearables* MS 1999
- Cagatay Candan, *Information Hiding in Image Signals* MS 2000
- Jeng-Shiann Jiang, *Wireless System Design with HP-ADS Tools* MS 2000
- Sinthia Khan, *Image and Video Coding using JPEG2000* MS 2000
- G.V.Rangaraj, *Speech Communications over Lucent WaveLan* MS 2000
- Chih-Heng Shih, *Analysis of MPEG-Video Traffic* MS 2000
- Sridharan Subramanian *Document Parsing for Wireless Multimedia* MS 2000
- Nikhil Mittal, *Digitization of Cartoon Images* MS 2001
- Chung-Seok Seo, *Watermarking of Audio Signals* MS 2001
- Roberto Uzcategui , *Range Extension in Broadband ADSL* MS 2007

Doctoral Theses

- Jung-Hyuck Jo, *Site-Specific Prediction of Wireless Propagation* PhD 2003
- Janghyun Yoon, *Semantic Information Retrieval using Wireless Links* PhD 2003
- Cagatay Candan, *Information Hiding in Image Signals* PhD 2004
- Brian Delaney, *Power Efficient Distributed Voice Interface* PhD 2004
- Babak Firoozbakhsh, *Optimization of Home Wireless Networks* PhD 2007
- Nitin Suresh, *Functional Measures of Digital Video Quality* Defense 2007
- Sira Rao, *Region-of-Interest Video Coding for Mobile Telehealth* Defense 2007
- Seong-Hwan Jang, *Error Resilient Wireless Video Messaging* Defense 2007

Research Support Summary

- Georgia Tech Broadband Institute Industry Funding (2002-2007) $ 1680 K
- Georgia Tech Wireless Institute Industry Funding (1999-2001) $ 800 K

- GRA Funding of Advanced Communications Infrastructure (1999-2007) $ 4055 K
- Yamacraw Program in Broadband System Prototyping (2000 -2004) $ 5495 K

- GRA Matching of Broadband Research (2005-2007) $ 280 K
- GRA Eminent Scholar Grant for Telehealth Research (2004-2006) $ 101 K

- My Federal Research Proposals focused on ambitious new centers in the STC and ERC programs. While unfunded, these proposals led directly to subsequent smaller grants led by the associate PIs of those major proposals, notably ITR grants in Wireless and Aware Home Research $ 2.4 M

Research Support Details

- Georgia Tech Broadband Institute Industry Funding (2002-2007) $ 1.68 M
  - PI: Nikil Jayant

  - Co-PIs: Gordon Stuber (ECE) Raghupathy Sivakumar (ECE) Mustaque Ahamad (CoC) MaryAnn Ingram (ECE)
  - Sponsors: BellSouth HP Labs Panasonic Labs Comcast Tellabs Cox Communications Cisco Systems EGT Arris Interactive Intel Nortel Networks Broadcom

- Georgia Tech Wireless Institute Industry Funding (1999-2001) $ 800 K
  - PI: Nikil Jayant
  - Co-PI: Gordon Stuber (ECE)
  - Sponsors: Bellsouth Ericsson Connexant Systems

- GRA Funding of Advanced Communications Infrastructure (1999-2007) $ 4.05 M
  - PI: John Limb (CoC) Co-PI: Nikil Jayant Cable and Residential Labs
  - PI: Nikil Jayant Software Radio, Smart Antenna and Optical Labs
  - Sponsor: Georgia Research Alliance

- Yamacraw Program in Broadband System Prototyping (2000 -2004) $ 5.49 M
  - PI: Nikil Jayant
  - Co-PIs: Steve McLaughlin MaryAnn Ingram Gordon Stuber Ian Akyildiz Tom Pratt Steve Ralph (All ECE)
  - Sponsor: State of Georgia (Yamacraw Program)

- Georgia Research Alliance Matching of Broadband Research (2005-2007) $ 280 K
  - PI: Nikil Jayant
  - Co-PIs: Mary Ann Ingram (ECE) Mustaque Ahamad (CoC) Benny Bing (ECE) Janet Murray (LCC)

- GRA Eminent Scholar Grant for Telehealth Research (2004-2006) $ 101 K
  - PI: Nikil Jayant
  - Co-PIs: Max Stachura (MCG), Lars Mathiassen (GSU)
    - Max Stachura was the lead PI in 2006

- My NSF Research Proposals focused on ambitious new centers in the STC, ERC and Large –ITR programs. While unfunded, these proposals led to subsequent smaller grants led by the Associate PIs of those major proposals, notably ITR grants in Wireless and Aware Home research : $2.4 M

Active and Pending Support

- Georgia Tech Broadband Institute Industry Funding (to December 2007) $ 370 K
  - Georgia Research Alliance Matching (to June 2008) $ 180 K
  - PI: Nikil Jayant Co-PIs: Mustaque Ahamad (CoC) Janet Murray (LCC)
- Revision of NIH- R01 Grant : Initially submitted 2006, To be revised: July 2007
  Real Time Wireless Visual Communications for Remote Pediatric Assessment
  - Nikil Jayant (PI) Co-PI: Max Stachura (MCG) $ 1.6M

BELL LABORATORIES HIGHLGHTS

Director, Multimedia Communications Research Laboratory, Lucent 1995- 1998

Created new laboratory and led staff of 100, with 8 Department Heads and 75 PhD's.
Created new businesses with estimated revenues of $100M (1998) and $500M (2000):

- Wireless and Internet Technologies for Speech, Audio and Video Communication
- Natural Language Human-Computer Dialog for Call Centers
- Digital Audio Broadcasting using Terrestrial AM / FM and Satellite Bands
- User Authentication Software based on Biometrics: Fingerprint, Voiceprint and Faceprint

Head, Signal Processing Research Department, AT&T 1986-1995

Created department for advancing communications signal processing, leading to new technologies and businesses with revenues in the multiple $100M :

- a new 16 kbps ITU International standard for low-delay network telephony
- a low-complexity voice coder for AUDIX Voicemail, now deployed in 40 countries
- wireless and speech technologies for the North American Cellular standard
- algorithms for perceptual coding, as a definitive basis of image and HDTV compression
- technology for high-speed, high-density magnetic recording for disk-drives

Head, Advanced Audio Technology Department, AT&T 1992 -1995

Created department to respond to the emerging opportunity in digital audio, managed it concurrently with the Signal Processing Research Department. to define :

- the ISO-MPEG Layer 3 standard for audio coding , the original version of MP3 audio
- technology and strategy for terrestrial and satellite (Sirius Audio) broadcasting
- the world's first prototype of the solid-state audio player (solid-state CD)

Supervisor, Digital Voice Coding Group, AT&T 1982-1986

Responsible for research in voice coding in support of applications in digital telephony and voice storage. Contributions include:

- ITU standards for high-quality audio communications (based on Sub-band coding and ADPCM)
- New US government standards and terminals for secure voice (based on LPC, CELP)
- Software and hardware for analog voice privacy over telephone lines

Member of Technical Staff, Acoustics Research Department, AT&T 1968-1982

Research in the field of digital coding and transmission of information signals:

- a family of ITU international standards for network telephony at 16-32 kbps
- worldwide technology for personal communications : DECT, Handyphone
- pioneering algorithms for speech encryption, packet voice and vector quantization
- a signal enhancement algorithm that has enabled the widespread deployment of PC-telephony
- a record of publications that have defined several subfields of signal compression

Other Bell Labs Contributions

Chairperson, Bell Labs Divisional Summer Program for Minorities (1986-88)
Lecturer, Lucent Science and Technology International Seminars (1995-1997)

PROFESSIONAL CONTRIBUTIONS AND HONORS

PROFESSIONAL CONTRIBUTIONS

Books

Waveform Quantization and Coding IEEE Reprint Press 1976
Digital Coding of Waveforms (with P.Noll) Prentice Hall 1984
Signal Compression: World Scientific 1997
Broadband: Bringing Home the Bits (Committee Chair) National Academies Press 2002
Broadband Last Mile Technologies Marcel Dekker / CRC Press 2005

Academic and Teaching Experience

Research Associate, Stanford University 1967-68
Visiting Professor, Indian Institute of Science 1974, 1977
Visiting Professor, University of California at Santa Barbara 1984
Faculty, UCLA, UCSB and Rutgers Extension Courses in Communications 1975-89
Faculty, Elsevier (Europe) Courses in Speech and Image Processing 1991-93
IEEE Lecturer on Digital Audio at ICASSP Meeting 1993
Guest Lecturer in Signal Processing, Digital Communications and Multimedia (1994-):
Technical University of Berlin, National Taiwan University, Indian Institute of Science, University of Maryland, Columbia University, Princeton University, University of Michigan, University of Southern California, University of California at Santa Barbara, Technion University at Haifa, Israel, Middle University Turkey, National University of Singapore
Bell Labs Lecturer, In-house Courses (1970-1990) and International Seminars (1995-97)
IEEE Distinguished Lecturer (2000)
Creator and teacher of new graduate course, *Multimedia Communications* (Georgia Tech)

Invited and Keynote Talks

IEEE Audio Workshop (Mohonk, 1989)
IEEE Communication Theory Workshop (Florida Keys, 1992)
IEEE Speech Coding Workshop (Toronto, 1994)
IEEE International Conference on Image Processing (Orlando, 1995)
European Signal Processing Society: Annual Symposium (Norway, 1995)
IEEE Conference on Visual Communications and Image Processing (Lausanne, 1996)
IEEE Asilomar Conference (Pacific Grove, 1997)
IEEE Media Briefing celebrating 50 years of Signal Processing (NY, 1997)
Keynote, IEEE Signal Processing Society Meeting (Seattle, 1998)
Keynote, Second SPIE Conference on Digital Wireless Communications (Orlando, 2000)
Motorola University Wireless Futures Forum (Phoenix, 1999)
Keynote, Technion University Haifa, 25th Anniversary of Signal Processing School
IEEE Conference on Highly Interactive Computing (Bangalore, 2001)
IEEE Conference on Communications and Signal Processing (Singapore, 2001)
International Conference on Systems, Signal and Image Processing (Rome, 2003)
Keynote, IEEE-ICASSP (Acoustics, Speech and Signal Processing) (Montreal, 2004)
American Telemedicine Association Conference (Nashville, 2007)

Contributions to Conferences, Standards, National Organizations and Industry

Co-Guest Editor, *IEEE Trans on Communications*, Issue on Bit Rate Reduction (1982)
First Editor-in-Chief, *IEEE Signal Processing Magazine* (1984-86)
Co-Guest Editor, *IEEE Communications Magazine*, Issue on Signal Processing (1993)
Editor, *Special Issue of AT&T Journal on Multimedia Technologies* (1995)
Editor, Chapter on Digital Audio, in *IEEE-CRC Handbook on Signal Processing* (1998)
Editor, *Proc.IEEE Special Issue on Gigabit Wireless* (2004)

Organizer and/or Chair: Numerous IEEE Conference Sessions including, most recently:
Multimedia Technology and Services, at the IEEE Tyrrhenian International Conference on Digital Communications (Ischia,1999)
Signal Processing for Multimedia Communications at the IEEE Globecom (Rio, 1999)
Information Retrieval: A System View at the Third International Symposium on Information and Signal Processing and Analysis (Rome, 2003)
Organizer, GCATT Symposium on Next Generation Video (Georgia Tech, 2003)
Organizer and Chair, IASTED Telehealth Special Session on Visual Telediagnosis (Montreal, 2007)

Member: ISO-MPEG Committees on Audio and Video Standards (1989-94)
Member: CEMA, NRSC and FCC Committees or Panels for Digital Audio Broadcasting
Member: NSF Expert Panels on Joint Source and Channel Coding (1999) and Communications Signal Processing (2001)
Member: Expert Panel on Embedded Hybrid Systems, Singapore NSF (2002)
Chair: NAS-CSTB Committee on Broadband Last-Mile Technologies (1999-2002)
Member of Scientific Advisory Board, NTT-DoCoMo USA (2001-2002)
Member of Scientific Advisory Board, Infocomm Institute, Singapore (2002-)

Invited contributor, CENIC: *Corporation for Education Networks Initiative in California* (2003)
Invited Panelist, IEEE ICC, *Industry Academic Collaborations, Glasgow (2007)*

CONSULTANCIES

Founder and President of Consulting Company, MediaFlow LLC	1999-present
Qualcomm/Cooley Godward LLP (Digital Cellular Telephony)	1999
Interdigital/Fulbright and Jaworski LLP (Digital Cellular Telephony)	2000-2003
Gartner Group (Media Computing)	2000
AT&T/Cooley Godward LLP (Speech Coding)	2001-2003
HP Labs/Fulbright and Jaworski (Image and Video Coding)	2002
Lucent/Kirkland and Ellis LLP (Audio Coding)	2002-present
Ibiquity (Audio Coding)	2003

AWARDS AND HONORS

Alfred Hay Gold Medal (Best ECE Student, Indian Institute of Science, 1965)

IEEE Browder Thompson Memorial Prize Paper Award (1974)

IETE-India Industry Paper Award (1990)

IEEE Donald Fink Prize Paper Award (1995)

Lucent Patent Recognition Award (1997)

New Jersey Inventors Hall of Fame (1998)

IEEE Distinguished Lecturer (2000)

Elected Fellow of the IEEE (1982)
For contributions to adaptive quantization and speech communication

Elected to the National Academy of Engineering (1996)
For contributions to the compression of speech, audio and image signals

Recipient, IEEE Third Millennium Medal (2000)
For contributions to Signal Processing

PUBLICATIONS: PAPERS, BOOK CHAPTERS AND BOOKS

Journal and Conference Publications, Book Chapters and Books

Jayant, N. S., *An 'erasure' scheme for atmospheric noise burst interference*, Proc. IEEE, p. 1944, Dec. 1966.

Jayant, N. S., *Data communication through the atmospheric burst error channel*, IEEE Trans. Comm., pp. 383-389, June 1967.

Jayant, N. S., *A retransmission scheme for data communication in the presence of atmospheric noise bursts*, Jour. Inst. of Telecomm. Eng. (India), pp. 109-115, Mar. 1968.

Jayant, N. S., *Adaptive delta modulation with a one-bit memory*, Bell Syst. Tech. Jour., pp. 321-342, Mar. 1970.

Jayant, N. S., *Spectral location of Rayleigh and 'm' fading signals in white Gaussian noise***,** IEEE Trans. Aerospace and Electronics Syst., pp. 228-238, Mar. 1970.

Jayant, N. S., *Characteristics of a delta modulator*, Proc. IEEE: Letters, pp. 428-429, Mar. 1971.

Jayant, N. S., *Further results on adaptive delta modulation with a one-bit memory***,** Proc. Int. Conf. Comm., Montreal, vol. 1, pp. 16-21, June 1971.

Jayant, N. S. and Shipley, K., *Multiple delta modulation of a speech signal*, Proc. IEEE, p. 1382, Sept. 1971.

Jayant, N. S. and Rosenberg, A., *The preference of slope overload to granularity in the delta modulation of speech*, Bell Syst. Tech. Jour., pp. 3117-3125, Dec. 1971.

Jayant, N. S., *Delta modulation of pitch, formant and amplitude signals for the synthesis of voiced speech*, Proc. Int. Conf. Speech Comm. and Processing, Apr. 1972.

Jayant, N. S., Cummiskey, P., and Flanagan, J. L., *Design and implementation of an adaptive delta modulator*, Proc. IEEE Int. Conf. Speech Comm. and Processing, Boston, MA, Apr. 1972.

Jayant, N. S., *A study of statistical pattern verification*, IEEE Trans. Syst. Man and Cybernetics, pp. 238-246, Apr. 1972.

Jayant, N. S. and Rabiner, L. R., *The application of dither to the quantization of speech signals*, Bell Syst. Tech. Jour., vol. 51, no. 6, pp. 1293-1304, Jul.-Aug. 1972.

Jayant, N. S., *Delta modulation of pitch, formant and amplitude signals for the synthesis of voiced speech*, IEEE Trans. Audio and Electroacoustics Special Issue on Speech Comm., pp. 135-140, June 1973.

Jayant, N. S., *Adaptive quantization with a one-word memory*, Bell Syst. Tech. Jour., pp. 1119-1144, Sept. 1973.

Cummiskey, P. Jayant, N. S., and Flanagan, J. L., *Adaptive quantization in differential PCM coding of speech*, Proc. IEEE Int. Commun. Conf., Seattle, WA, June 1973. Also in Bell Syst. Tech Jour., vol. 52, pp. 1105-1118, Sept. 1973.

Jayant, N. S., *Digital coding of speech waveforms*, Proc. of IEEE, pp. 611-632, May 1974, Invited Paper (IEEE Browder Thompson Award)

Jayant, N. S., *On the correlation between bit sequences in consecutive delta modulation of a speech signal*, Bell Syst. Tech. Jour., pp. 937-946, May 1974.

Jayant, N. S., *On the power spectrum of the staircase function in linear delta modulation*, IEEE Trans. Acous., Speech and Sig. Processing, pp. 162-168, Apr. 1975. Also in Proc. Int. Cong. on Acous., 1974.

Cummiskey, P , Jayant, N. S., Schafer, R. W.and Flanagan, J. L., *Hardware ADPCM coder*, Proc. IEEE Int. Conf. Audio & Electroacoustics, 1974.

Jayant, N. S. and Sambur M. R., *LPC synthesis starting from white noise corrupted or differentially quantized speech*, Proc. Int. Conf. Acous., Speech and Sig. Processing, Apr. 1975.

Jayant, N. S., Schafer, R. W., and Karim, M. R., *Step-size-transmitting differential coders for mobile telephony*, Proc. Int. Conf. Comm., vol. 30, pp. 6-10, June 1975.

Jayant, N. S., *Step-size transmitting differential coders for mobile telephony*, Bell Syst. Tech. Jour., pp. 1557-1582, Nov. 1975.

Jayant, N. S., *An auto-correlation criterion for the time diversity reception of speech over burst error channels*, Bell Syst. Tech. Jour., pp. 1583-1596, Nov. 1975.

Jayant, N. S., *Average and median-based smoothing techniques for improved digital speech quality in the presence of transmission errors*, IEEE Trans. Comm., pp. 1043-1045, Sept. 1976.

Jayant, N. S. and Sambur M. R., *Speech encryption by manipulations of LPC parameters***,** Bell Syst. Tech. Jour., pp. 1373-1388, Nov. 1976.

Jayant, N. S. and Sambur M. R., *LPC synthesis from speech inputs containing quantizing noise or additive white noise*, IEEE Trans. Acous., Speech and Sig. Processing, pp. 448-494, Dec. 1976.

Jayant, N. S.(ed.) , ***Waveform Quantization and Coding***, IEEE Press Reprint Book, 1976.

Jayant, N. S., *Pitch-adaptive DPCM coding of speech with 2-bit quantization and, fixed spectrum prediction*, Bell Syst. Tech. Jour., pp. 439-454, Mar. 1977.

Jayant, N. S. and Kak, S.C., *On speech encryption using waveform scrambling*, Bell Syst. Tech. Jour., pp. 781-808, May-June 1977.

Jayant, N. S., *Speech encryption by manipulation of LPC and waveform-code parameters***,** Proc. Int. Conf. Comm., June 1977.

Jayant, N. S., *On the delta modulation of a first-order Gauss-Markov signal*, IEEE Trans. Comm**.**, pp. 150-155, Jan. 1978.

Jayant, N. S., Crochiere, R. E., Rabiner, L. R., Tribolet, J. M., *A study of objective measures for speech waveform coders*, Proc. Int. Zurich Sem. on Digital Comm., H1.1 to H1.7, Mar. 1978.

Jayant, N. S., *A first-order Markov model for understanding delta modulation noise spectra*, IEEE Trans. Comm., pp. 1316-1318, Aug. 1978.

Jayant, N. S and Christensen, S. W., *Tree encoding of speech using the (M,L) - Algorithm and adaptive quantization*, IEEE Trans. Comm., pp.1376-1379, Sept. 1978.

Jayant, N. S., *Waveform Coding of Speech*, Jour. of Acous. Soc. of India, pp. 65-74, Oct. 1978, Invited Paper.

Flanagan, J. L., Schroeder, M. R., Atal, B. S., Crochiere, R. E., Jayant, N. S., and Tribolet, J. M., *Speech Coding*, IEEE Trans. on Comm., vol. COM-27, pp. 710-737, Apr. 1979. Invited Paper.

Jayant, N. S. and Christensen, S. W., *Adaptive aperture coding of speech waveforms-I***,** Bell Syst. Tech. Jour., pp. 1631-1645, Sept. 1979.

Jayant, N. S., Steele, R., and Schmidt, C., *Statistical block protection coding for DPCM coded speech*, Bell Syst. Tech. Jour., pp. 1647-1697, Sept. 1979.

Jayant, N. S., Steele, R., Chan, N. W., and Schmidt, C. E., *On soft decision demodulation for PCM- and DPCM-encoded speech*, IEEE Trans. Comm., pp.308-311, Feb. 1980.

Jayant, N. S. and Christensen, S. W., *Adaptive aperture coding of speech waveforms-II***,** Bell Syst. Tech. Jour. (Brief), pp. 471-477, Mar. 1980.

Jayant, N. S., *Effects of packet losses in waveform coded speech*, Proc. Int. Conf. Computer Comm**.**, Atlanta, GA, 1980.

Jayant, N. S., McDermott, B. J., Christensen, S. W., and Quinn, A. M., *A comparison of four methods of analog speech encryption*, IEEE Trans. Comm., pp.18-23, Jan. 1981. Also in Proc. Int. Conf. Comm., Seattle, WA, June 1980.

Jayant, N. S. and Steele, R., *Statistical block protection coding for DPCM-AQF speech***,** IEEE Trans. Comm**.**, pp. 1899-1907, Nov. 1980.

Jayant, N. S. and Christensen, S. W., *Effects of packet losses on waveform coded speech and, improvements due to an odd-even interpolation procedure*, IEEE Trans. Comm., pp. 101-109, Feb.1981.

Jayant, N. S., *Subsampling of a DPCM speech channel to provide two self-contained, half-rate channels*, Bell Syst. Tech. Jour., pp. 501-509, Apr. 1981. Also in Proc. of Int. Conf. Comm., Denver, CO, June 1981.

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